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To:

Name Bureau of Land Management

Company _____

Telephone _____

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From:

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Company The Wilderness Society

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Comments March Lease Sale Protest



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**THE WILDERNESS SOCIETY * MONTANA
WILDERNESS ASSOCIATION * PARK COUNTY
ENVIRONMENTAL COUNCIL**

BLM Montana/Dakotas State Director
5001 Southgate Drive
Billings, MT 59101

**Via Facsimile: 406-896-5292
And Via Federal Express**

January 11, 2018

**Re: Protest of the March 13, 2018 Competitive Oil and Natural Gas Lease Sale for the
Bureau of Land Management Butte and Billings Field Offices and North Central Montana
District.**

To whom it may concern:

Please accept this protest of the above oil and natural gas lease sales on behalf of The Wilderness Society, Park County Environmental Council, and the Montana Wilderness Association. This protest is filed pursuant to the provisions at 43 C.F.R. § 3120.1-3. In this lease sale, the Bureau of Land Management (BLM) is proposing to sell 9 lease parcels in the Butte Field Office, 76 parcels in the Billings Field Office, and 24 parcels in the North Central Montana District, which would cover approximately 63,496 acres of federal mineral estate and 36,365 acres of federally owned surface land.

Founded in 1935, The Wilderness Society's mission is to protect wilderness and inspire Americans to care for our wild places. Founded in 1958, the Montana Wilderness Association's mission is to work with communities to protect Montana's wilderness heritage, quiet beauty and outdoor traditions, now and for future generations. The Park County Environmental Council safeguards and enhances the lands, water and wildlife in Yellowstone's northern gateway through a powerful community-based advocacy network.

I. INTERESTS OF THE PARTIES

The Wilderness Society, Montana Wilderness Association, and Park County Environmental Council have a long-standing interest in the management of BLM lands in Montana and we engage frequently in the decision-making processes for land use planning and project proposals that could potentially affect our public lands and mineral estate, including the oil and natural gas leasing process and lease sales. Our members and staff enjoy a myriad of recreational, scientific and other opportunities on BLM-managed public lands, including hiking, biking, nature-viewing, photography, and quiet contemplation in the solitude offered by wild

places. As indicated, our missions are to work for the protection and enjoyment of the public lands for and by our members and the public.

II. AUTHORIZATION TO FILE THIS PROTEST

As an attorney and Litigation and Energy Policy Specialist for The Wilderness Society, I am authorized to file this protest on behalf of The Wilderness Society and its members and supporters, and have like authority to file this protest on behalf of the Montana Wilderness Association and Park County Environmental Council.

III. STATEMENT OF REASONS

We protest the potential sale of all 109 parcels that are proposed to be offered in this lease sale. These parcels are shown in Appendix A of each of the three environmental assessments (EA) that were prepared for this lease sale: EAs DOI-BLM-MT-L002-2017-0003-EA (Butte Field Office), DOI-BLM-MT-L002-2017-0002-EA (Billings Field Office), DOI-BLM-MT-L002-2017-0004-EA (North Central Montana District). This protest is based on the three comment letters on each of the draft March EAs that were filed on October 30, 2017 by The Wilderness Society. The Montana Wilderness Association joined the TWS comment letter on the North Central Montana District's draft EA.

In this protest, we again object to the potential sale of these 109 lease parcels on the bases we outlined in our October 30, 2017 EA comments. The BLM did not remedy the flaws and concerns set out in our comment letters. These issues include:

- Lack of compliance with the National Environmental Policy Act (NEPA) due to a failure to consider a reasonable range of alternatives in the EA, and a failure to take a hard look at the environmental impacts of leasing on the Town of Livingston, the Yellowstone River, and Upper Missouri River Breaks National Monument (UMRBNM), as well as a failure to consider the cumulative impacts of leasing in sage-grouse habitats.
- Violations of the Federal Land Policy and Management Act (FLPMA) by not meeting the multiple use mandate of FLPMA due to improper reliance on recent Executive Orders and Orders of the Secretary of the Interior, and a failure to consider and abide by the land use plan amendment leasing prioritization requirements that were adopted to protect sage-grouse.

We reiterate those concerns here and they form the bases for this protest. Likewise, we reincorporate our three October 30, 2017 comment letters into this protest by this reference and ask that those comments be reconsidered again as bases for this protest.

A. BLM's Attempts to Rebut and to Ignore the Concerns Raised in Our Three October 30, 2017 Comment Letters Have No Legal Basis.

BLM attempted to respond to the concerns we raised in our three October 30, 2017 EA comment letters, as shown in Appendix D of the Butte EA, Appendix G of the Billings EA, and Appendix F of the North Central Montana District EA. However, BLM's statements do not provide an adequate response to the identified flaws in the EAs and the proposed lease sale.

Generally speaking, in responding to concerns about the lack of consideration of a reasonable range of alternatives, the failure to take a hard look at environmental impacts of leasing, the failure to abide by FLPMA's multiple use mandate, cumulative impacts to sage-grouse habitats, and compliance with conservation measures in the Approved Resource Management Plan Amendments (ARMPA) for sage-grouse, BLM generally states that: selling the lease parcels complies with the applicable resource management plans (RMP), the lease parcels have sufficient stipulations to meet any concerns, site-specific impacts are not known at the leasing stage and thus cannot be considered yet, and it is national policy to engage in oil and gas leasing and promote mineral development. These are unsubstantiated claims and do not resolve our concerns or the flaws in the BLM's proposed leasing decisions.

1. BLM has still not considered a reasonable range of alternatives.

As to the issue of considering an adequate range of alternatives, a summary treatment of alternatives, as has occurred here, "must be measured against the standards in 42 U.S.C. § 4332(2)(E) and 40 C.F.R. 1508.9(b)." *Davis v. Mineta*, 302 F.3d 1104, 1120 (10th Cir. 2002) (noting these provisions require an agency to study, develop and discuss appropriate alternatives and to briefly describe those alternatives). An agency's rejection of alternatives in an EA will be deemed illegal if the consideration is "so vague and unspecific as to be little more than platitudes." *Id.* at 1121. In a case where "[a]lternatives were dismissed in a conclusory and perfunctory manner that do not support a conclusion that it was unreasonable to consider them as viable alternatives in the EA", the agency's action will be rejected. *Id.* at 1122. As here, *Davis* involved a situation where the agency only considered two alternatives in its EA, the no action alternative and the preferred highway construction alternative, which the court deemed illegal.

Here, we have nothing more than platitudes being used to reject consideration of additional alternatives in the March EAs. *See, e.g., Butte Mar. 23, 2018 Oil and Gas Lease Sale EA App. A at 5.* We have BLM's bare assertion that it met its obligation to consider a reasonable range of alternatives, but nothing more. This does not meet the requirements of NEPA. *See, e.g., Colo. Envtl. Coalition v. Salazar*, 875 F. Supp. 2d 1233, 1248-50 (D. Colo. 2012) (requiring consideration of alternatives that satisfy the project's purpose and need and are neither "speculative" nor "infeasible").

BLM acknowledges that there are potential impacts on the environment, even with the lease stipulations and other measures identified in the EAs. *See, e.g., Butte Mar. 23, 2018 Oil and Gas Lease Sale EA App. A at 5.* Yet, BLM refused to consider any middle-ground alternatives suggested by the public that would further reduce these impacts. These alternatives, which include deferring specific parcels located in sensitive locations, such as along the Yellowstone River and directly across from the Town of Livingston, or deferring parcels in sage-grouse habitat, clearly satisfy the project's purpose and need: "The purpose and need for this action is to respond to Expressions of Interest to lease parcels of land for oil and gas

development as mandated by Federal laws, including the Mineral Leasing Act of 1920, Federal Land Policy and Management Act of 1976, and Federal Onshore Oil and Gas Leasing Reform Act of 1987.” *E.g., id.*, at 6. Further, these alternatives are neither “infeasible” nor “speculative,” given BLM’s broad discretion over leasing on public lands and duties to manage for other uses and activities, not just oil and gas development. Thus, BLM failed to evaluate a reasonable range of alternatives, as required by NEPA.

2. BLM has failed to take a hard look at the impacts of leasing.

BLM’s failure to take a hard look at the environmental impacts of leasing—its refusal to consider impacts until there is an actual drilling proposal—violates NEPA because it does not acknowledge that oil and gas leasing represents an irreversible and irretrievable commitment of resources. As stated by the Tenth Circuit Court of Appeals,

... we first ask whether the lease constitutes an irretrievable commitment of resources. Just as we did in *Pennaco Energy*, 377 F.3d at 1160 and the D.C. Circuit did in *Peterson*, 717 F.2d at 1412, 1414, we concluded that issuing an oil and gas leases without an NSO [no surface occupancy] stipulation constitutes such a commitment.

New Mexico v. Bureau of Land Management, 565 F.3d 683, 718 (10th Cir. 2009).

The BLM discusses the likelihood of drilling in the three EAs (each of the EAs contains a “Reasonably Foreseeable Development Scenario” section), and there is at least some likelihood of wells be drilled on the Butte and Billings Field Office parcels, and on the North Central District parcels. It is anticipated 4 wells could be drilled on the lease parcels in the Butte Field Office (Butte EA at 12-13), 5.4 wells per year could be drilled on the Billings Field Office parcels (Billings EA at 17), and 11 wells could be drilled on the North Central District parcels (North Central Montana District EA at 16).

Thus, there are reasonably foreseeable impacts from the irreversible and irretrievable commitment represented by leasing, and these potential impacts cannot be ignored. If leases are issued now, it becomes difficult or impossible for BLM to change course later. As identified in TWS’s comments on the EAs, there are potential impacts on the Town of Livingston, Yellowstone River, UMRBNM, and Greater sage-grouse habitat that still have not been examined by BLM. For instance, while BLM included a reference to UMRBNM in the North Central Montana District’s EA, it did not actually evaluate the potential impacts of leasing on the monument and whether additional measures were necessary to avoid or mitigate those impacts.

Additionally, relative to cumulative impacts to sage-grouse and sage-grouse habitats, the BLM continues to ignore, let alone analyze, the widespread leasing that is occurring in sage-grouse habitats outside the Billings and Butte Field Offices and the North Central Montana District. We documented some, but not nearly all, of those lease sales in our October 30, 2017 comments. NEPA requires BLM to evaluate the cumulative impacts of this lease sale “resulting from the incremental impact of the action when added to other past, present, and reasonably

foreseeable future actions.” 40 C.F.R. § 1508.27(b)(7); *Kern v. Bureau of Land Management*, 282 F.3d 1062, 1075-77 (9th Cir. 2002).

BLM (in the Rocky Mountain Region Record of Decision and other sage-grouse plan amendments) and numerous authorities have recognized the importance of addressing sage-grouse conservation on a comprehensive range-wide basis, and accounting for connectivity between state and regional populations and habitats, habitat fragmentation, and other impacts. As stated in the Rocky Mountain Record of Decision (ROD): “The cumulative effect of these measures is to conserve, enhance, and restore GRS habitat across the species’ remaining range in the Rocky Mountain Region and to provide greater certainty that BLM resource management plan decisions in GRS habitat in the Rocky Mountain Region can lead to conservation of the GRS and other sagebrush-steppe-associated species in the region.” Rocky Mountain ROD, p. S-2. The BLM must provide an analysis and make leasing decisions that advance this policy, but it has failed to do so.

Under NEPA, BLM cannot lease hundreds of parcels covering many thousands of acres in Montana, Wyoming and other states without considering the cumulative and trans-boundary impacts to the greater sage-grouse and other resources. It has failed to do so in the Montana March EAs, and thus we protest the proposed sale of the 109 parcels included in this lease sale.

In sum, the potential environmental impacts of leasing must be considered at the leasing stage to meet the requirements of NEPA.

3. BLM has not complied with FLPMA’s multiple use mandate.

As to the failure to meet FLPMA’s multiple use mandate, BLM cannot meet this requirement under its “lease everything” approach where only two alternatives are considered. While leasing and oil and gas development are permissible uses on most BLM lands, it is only permissible when there is a careful balancing with other uses and values. Leasing all 109 parcels that have been nominated does not meet BLM’s multiple use obligations. Even if the applicable RMPs permit leasing of these lands, leasing is not mandated.

“Under applicable laws and policies, there is no presumed preference for oil and gas development over other uses.” BLM Instruction Memorandum (IM) 2010-117 at 2. BLM’s NEPA handbook prohibits it from only considering alternatives that an industry proponent of a project desires. BLM NEPA Handbook H-1790-1 at 49-50. As we have noted in comments on other BLM leasing EAs,

Federal courts have consistently rejected efforts to affirmatively elevate energy development over other uses of public lands. In the seminal case, *New Mexico ex rel. Richardson v. BLM*, the Tenth Circuit put to rest the notion that BLM can manage chiefly for energy development, declaring that “[i]t is past doubt that the principle of multiple use does not require BLM to prioritize development over other uses.” 565 F.3d 683, 710 (10th Cir. 2009); see also *S. Utah Wilderness Alliance v. Norton*, 542 U.S. 52, 58 (2004) (defining “multiple use management” as “striking a balance among the many competing uses to which land can be

put"). Other federal courts have agreed. *See, e.g., Colo. Envtl. Coalition v. Salazar*, 875 F. Supp. 2d 1233, 1249 (D. Colo. 2012) (rejecting oil and gas leasing plan that failed to adequately consider other uses of public lands).

At its root, BLM's "lease everything" approach seems to be rooted in the "energy dominance" policy of this Administration. BLM seems to be being driven by Executive Order No. 13783 (Promoting Energy Independence and Economic Growth) and Secretary of the Interior Order 3349 (American Energy Independence). But these administrative directives cannot override the statutory directives in FLPMA. It is the policy of the United States to protect natural resources on the public lands. 43 U.S.C. § 1701(a)(8). Multiple use means "the use of some of the land for less than all of the resources" as well as the "harmonious and coordinated management" of the resources "without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources . . ." *Id.* § 1702(c). Managing in compliance with the definition of multiple use is mandated, and this management must "prevent unnecessary or undue degradation of the lands." *Id.* §§ 1732(a) and (b). BLM's lease everything policy fails to meet these requirements, and thus fails to meet FLPMA's multiple use mandate.

B. BLM has Failed to Prioritize Leasing Outside of Greater Sage-Grouse Habitats

BLM has not prioritized leasing outside of sage-grouse habitat, as required by the ROD and ARMPA for the Rocky Mountain Region, Billings/Pompeys Pillar National Monument ARMPA, and the HiLine ARMPA. Under the Rocky Mountain ARMPA ROD:

. . . the ARMPs and ARMPAs prioritize oil and gas leasing and development outside of identified PHMAs [priority habitat management areas] and GHMAs [general habitat management areas]. This is to further limit future surface disturbance and encourage new development in areas that would not conflict with GRSG. This objective is intended to guide development to lower conflict areas and as such protect important habitat and reduce the time and cost associated with oil and gas leasing development by avoiding sensitive areas, reducing the complexity of environmental review and analysis of potential impacts on sensitive species, and decreasing the need for compensatory mitigation.

Rocky Mountain Region ARMPA ROD at 1-25.

The Billings/Pompeys Pillar National Monument ARMPA states that it will "[p]rioritize the leasing and development of fluid mineral resources outside GRSG habitat." Billings/Pompeys Pillar National Monument ARMPA at 2-6. And the HiLine ARMPA says the same thing: "[p]rioritize the leasing and development of fluid mineral resources outside GRSG habitat." HiLine ARMPA ROD at 1-19.

Prior to its replacement in late December, BLM IM 2016-143 elaborated on the way agency staff are to comply with the requirement to prioritize leasing and development outside of sage-grouse habitat:

Lands within GHMAs: BLM State Offices will consider EOIs for lands within GHMAs, after considering lands outside of both GHMAs and PHMAs. When considering the GHMA lands for leasing, the BLM State Office will ensure that a decision to lease those lands would conform to the conservation objectives and provisions in the GRSg Plans (e.g., Stipulations).

Lands within PHMA: BLM state offices will consider EOIs for lands within PHMAs after lands outside of GHMAs and PHMAs have been considered, and EOIs for lands within GHMA have been considered. When considering the PHMA lands for leasing, the BLM State Offices will ensure that a decision to lease those lands would conform to the conservation objectives and provisions in the GRSg Plans (e.g., Stipulations) including special consideration of any identified [Sagebrush Focal Areas].

IM 2016-143 at 4.

IM 2016-143 also set out factors to consider (i.e., parcel-specific factors) after applying this prioritization sequence:

- Parcels immediately adjacent or proximate to existing oil and gas leases and development operations or other land use development should be more appropriate for consideration before parcels that are not near existing operations. This is the most important factor to consider, as the objective is to minimize disturbance footprints and preserve the integrity of habitat for conservation.
- Parcels that are within existing Federal oil and gas units should be more appropriate for consideration than parcels not within existing Federal oil and gas units.
- Parcels in areas with higher potential for development (for example, considering the oil and gas potential maps developed by the BLM for the GRSg Plans) are more appropriate for consideration than parcels with lower potential for development. The Authorized Officer may conclude that an area has "higher potential" based on all pertinent information, and is not limited to the Reasonable Foreseeable Development (RFD) potential maps from Plans analysis.
- Parcels in areas of lower-value sage-grouse habitat or further away from important life-history habitat features (for example, distance from any active sage-grouse leks) are more appropriate for consideration than parcels in higher-value habitat or closer to important life-history habitat features (i.e. lek, nesting, winter range areas). At the time the leasing priority is determined, when leasing within GHMA or PHMA is considered, BLM should consider, first, areas determined to be non-sage-grouse habitat and then consider areas of lower value habitat.
- Parcels within areas having completed field-development Environmental Impact Statements or Master Leasing Plans that allow for adequate site-specific mitigation and are in conformance with the objectives and provisions in the GRSg Plans may be more appropriate for consideration than parcels that have not been evaluated by the BLM in this manner.
- Parcels within areas where law or regulation indicates that offering the lands for leasing is in the government's interest (such as in instances where there is drainage of Federal

minerals, 43 CFR § 3162.2-2, or trespass drilling on unleased lands) will generally be considered more appropriate for leasing, but lease terms will include all appropriate conservation objectives and provisions from the GRSG Plans.

- As appropriate, use the BLM's Surface Disturbance Analysis and Reclamation Tracking Tool (SDARTT) to check EOI parcels in PHMA, to ensure that existing surface disturbance does not exceed the disturbance and density caps and that development of valid existing rights (Solid Minerals, ROW) for approved-but-not-yet-constructed surface disturbing activities would not exceed the caps.

IM 2016-143 at 4-5.

These prioritization requirements continue to apply to this sale. The March EAs for the Billings Field Office and North Central District office acknowledge that a combined total of 19 parcels overlap PHMA and another 39 parcels overlap GHMA. Billings EA at 64; North Central Montana District EA at 45-46. FLPMA requires that lease sale decisions comply with governing land use plans. *See* FLPMA § 302(a), 43 U.S.C. § 1732(a) ("The Secretary shall manage public lands...in accordance with land use plans developed by him under section 1712 of this title..."); *see also* 43 C.F.R. § 1610.5-3(a) (48 Fed. Reg. 20,368 (May 5, 1983)) ("All future resource management authorizations and actions...shall conform to the approved plan.").

In its final EAs, BLM added a brief analysis of some (but not all) of the IM 2016-143 factors for the Billings and North Central offices. *See* Billings EA, Appendix F. Appendix F provides tables listing the number of parcels in several categories, including:

- (a) Whether the parcel is in grouse habitat (GHMA, RHMA or PHMA);
- (b) A "legal obligation" to lease;
- (c) Whether a parcel is "within existing disturbance" or "no existing disturbance"; and
- (d) Inside or outside a 3.1 miles distance from a lek.

Id. These tables show that many parcels cover grouse habitat and are outside of areas of existing disturbance, indicating they should be a low priority for leasing. Some of the parcels also lie within 3.1 miles of a lek. *Id.*

The low likelihood of drilling occurring on these parcels also emphasizes the need to prioritize leasing outside of these 19 PHMA and 39 GHMA parcels. In the Billings Field Office only 20 of the 76 parcels are in areas with a moderate development potential and 56 are in areas with low development potential. None have high development potential. Billings EA at 17. In the North Central Montana District, 11 of the 24 parcels have a low development potential and 2 have very low potential with only 9 parcels having a moderate development potential and 2 having a high development potential. North Central Montana District EA at 16. At a minimum, the BLM should have not have proposed to lease parcels in PHMA that are in areas with a low development potential.

After providing that information, however, BLM still plans to offer *all* of the leases in *all* of the prioritization categories. Appendix F fails to explain how a decision not to defer any

parcels actually applies the prioritization requirement of the RMPs.¹ Acknowledging the prioritization factors and RMP requirement is not the same as applying them.

Nor has BLM explained how a decision to offer all of the leases in GHMA, PHMA, and RHMA applies terms of the new Instruction Memorandum 2018-026, issued December 27, 2017. To the extent IM 2018-026 can be read as purporting to remove any requirement to limit leasing in sage-grouse habitat management areas, and the requirement to direct leasing outside those areas, it is inconsistent with the RMPs. The entire point of the RMPs' prioritization objective is to limit development and surface disturbance in important sage-grouse habitat—not simply to order BLM's administrative paperwork. Nor is the RMP prioritization requirement satisfied by "encourag[ing] lessees to voluntarily prioritize leasing" outside habitat management areas. IM 2016-026. The prioritization objective applies to BLM's decisions about where to offer leases—not the business choices of companies with no stewardship obligations—and it is binding on the agency.

With these comments, we are submitting and incorporating by reference a letter from leading sage-grouse scientist Dr. Matt Holloran addressing the importance of prioritization of leasing and development outside sage-grouse habitat, as well as the need to address the reasonably foreseeable cumulative impacts of leasing on the grouse. Attached as Exhibit 1 to these comments. This letter specifically cautions BLM against disregarding or abandoning the prioritization requirement. The letter further concludes that by disregarding the prioritization requirement, BLM is failing to protect sage grouse habitat at the landscape level as required by the ARMPAs.

BLM clearly must apply the prioritization objective from the RMPs to this lease sale when parcels are proposed in or near PHMA and GHMA, and explain how its leasing decision complies with that mandate. BLM has failed to do so. Even if the BLM is not required to defer the sale of *all* parcels in PHMA and GHMA, it is impossible to see how some of these parcels would not be deferred, if the RMPs were faithfully applied. "Priority" for leasing of fluid minerals outside of PHMA and GHMA would be demonstrated by deferring the sale of at least *some* lease parcels in these areas.

Leasing constitutes an irreversible and irretrievable commitment of resources, and in addition a lease gives a lessee the right to develop oil and gas. Form 3100-11 and 43 C.F.R. § 3101.1-2. Thus, it is clear that leasing has tangible aspects that cannot be ignored if BLM is to meet the commitment to prioritize leasing outside of sage-grouse habitats.

Under FLPMA, when an RMP is developed, the Secretary of the Interior must manage the public lands "in accordance" with the RMP. 43 U.S.C. § 1732(a). And under BLM's land use planning regulations, BLM must make resource management authorizations and take management actions in a way that "shall conform to the approved plan." 43 C.F.R. § 1610.5-

¹ BLM also offers no explanation for why it believes there is a "legal obligation" to offer five parcels for leasing. Even if the five parcels are located in unitized areas, or where drainage issues exist, that does not necessarily mandate that the area be leased.

2033 (48 Fed. Reg. 20368 (May 5, 1983)). Commenting on these provisions, the Supreme Court said:

The statutory directive that BLM manage “in accordance with” land use plans, and the regulatory requirement that authorizations and actions “conform to” those plans, prevent BLM from taking actions inconsistent with the provisions of a land use plan.

Norton v Southern Utah Wilderness Alliance, 542 U.S. 55, 68 (2004).

Thus, it is clear that the BLM must abide by the sage-grouse RMPs in this lease sale. BLM’s leasing decisions, not just its development decisions, must comply with the ARMPAs. BLM is to “prioritize oil and gas leasing . . . outside of identified PHMAs and GHMAs.” Rocky Mountain ARMPA ROD at 1-25. *See also* Billings/Pompeys Pillar National Monument ARMPA at 2-6 and HiLine ARMPA ROD at 1-19 (same).

IV. CONCLUSION

Thank you for considering this protest of the March 18, 2018 competitive oil and natural gas lease sale proposed in the BLM’s Butte and Billings Montana Field Offices and the North Central Montana District Office. We urge the BLM to address these important issues prior to leasing the protested parcels.

Sincerely,



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And on Behalf Of:

John Todd
Montana Wilderness Association

Erica Lighthiser
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EXHIBIT 1

March 13, 2018 MT Oil and Gas Lease Sale
Billings Field Office and Northcentral District of BLM
Review of potential effects to sage-grouse
Matt Holloran
Final_01/09/2018

Prioritizing Leasing of Non-Habitat

In order to achieve its sage-grouse conservation goals, BLM's prioritization commitment must be applied with the intent of achieving minimal leasing in sage-grouse habitat. The BLM does not establish that the directive for prioritizing leasing outside of priority (PHMA), general (GHMA) or restoration (RHMA) habitat management areas was applied in the Billings Field Office (BFO) or Northcentral District (NCD) EAs. By not prioritizing lease sales on lands outside of sage-grouse habitat, the BLM is not managing to avoid and minimize impacts to designated sage-grouse habitats. Nor is BLM managing sage-grouse habitats at spatial scales necessary to sustain populations.

The BFO and NCD EAs for the March 13, 2018 Oil and Gas Lease Sales in Montana (DOI-BLM-MT-L002-2017-0002-EA and DOI-BLM-MT-L002-2017-0004-EA, respectively) present a Lease Prioritization Sequence assessment on the nominated parcels listing factors from IM No. 2016-143 (BFO EA Appendix F; NCD EA Appendix E). BLM, however, does not explain how those assessments were applied to reach its leasing decision, which offers many parcels in the vicinity of active sage-grouse leks (70% of the parcels and 73% of the acres analyzed in the prioritization assessment are within 3.1 miles of a lek) and outside of areas with existing development (41% of the parcels and 46% of the acres analyzed in the prioritization assessment are situated in undeveloped areas). Importantly, of the parcels analyzed in the prioritization assessment, 26% of the parcels (12 of 46 parcels) and 33% of the acres (13,150 of 39,492 acres) offered for lease are located both within 3.1 miles of a lek and in sage-grouse habitats with no existing disturbance.

Overall, of the total parcels proposed for lease, 61% (61 of 100 parcels) are located in sage-grouse habitat; 58% of the acres (34,316 of 59,189 acres) being proposed for leasing are situated in sage-grouse habitat; and at least 61% of the lease parcels not covered under a No Surface Occupancy (NSO) stipulation are located in habitat types suitable for sage-grouse (BFO EA pgs. 53-54 and 64; NCD EA pgs. 41 and 50). Summary numbers presented in Appendices F (BFO EA) and E (NCD EA) differ from those presented in the EAs, and establish that 45% of the total parcels (49 of 110 parcels) and 63% of the total acres (40,465 of 63,738 acres) being proposed for lease are situated in sage-grouse habitat. Regardless of the numbers considered, the majority of the acreage in the planned lease sale is situated in sage-grouse habitat.

IM No. 2016-143 was replaced by IM 2018-026 after the release of the BFO and NCD EAs. IM 2018-026, however, does not eliminate the requirement to prioritize the leasing of parcels situated outside sage-grouse habitats, which remains an objective in the governing Approved Resource Management Plans (ARMPs) for the BFO and NCD. The point of the ARMP prioritization objective is to avoid and minimize leasing and development in sage-grouse habitat, which is not advanced by the planned lease sale.¹

It is worth noting that the ARMPs were developed against the backdrop of BLM's broader mitigation policies. BLM's approach to minimizing impacts to sage-grouse habitats is through the application of the mitigation hierarchy (BLM Mitigation Handbook H-1794-1), the initial step of which is avoidance. Avoidance at larger spatial scales is achieved through the prioritization commitment, as reflected in the

¹ IM 2018-026 states that "the BLM will continue to work cooperatively to avoid and minimize impacts to designated sage-grouse habitats." BLM also has not explained how its leasing decision applies IM 2018-026.

ARMPs for the BFO (MD FLUIDS-15) and NCD (3.2.5 Fluid Minerals). The BLM is severely limiting its ability to effectively apply the mitigation hierarchy and manage sage-grouse at landscape spatial scales by not prioritizing the leasing of lands outside of PHMAs, GHMAs and RHMAs and in unsuitable or marginally-suitable habitats.

To effectively manage sage-grouse at the population level, it is critical that the large, interconnected expanses of sagebrush habitats the species depends are managed at landscape spatial scales (Connelly et al. 2004). Lek persistence (i.e., the probability that a lek will remain active) and population-level genetic diversity are strongly related to habitat connectivity at these larger scales (Knick and Hanser 2011, Row et al. 2016). In the majority of cases in Montana, this suggests that landscape-scale management of sage-grouse must occur across multiple priority areas including the general and restoration habitat areas situated near these priority habitats (Edmunds et al. 2017). The BLM recognizes the importance of managing at scales necessary to sustain populations in the Billings ARMP by establishing a goal of “providing for the long-term conservation, enhancement, and restoration of the sagebrush steppe/mixed-grass prairie complex in a manner that supports sustainable sage-grouse populations” (WLH & SSS 8); the Hilina ARMP has a similar goal of “maintaining and/or increasing sage-grouse abundance and distribution by conserving, enhancing or restoring the sagebrush ecosystem upon which populations depend” (3.2.24 Wildlife). Yet, the BLM concluded in the EAs that areas containing the parcels being proposed for leasing would be satisfactorily assessed and mitigated for impacts to sage-grouse by applying the required stipulations as established in the appropriate ARMPs at the time of receiving an Application to Drill (APD [BFO EA pg. 65; NCD EA pg. 51]): “a detailed site-specific analysis and mitigation of activities associated with any particular lease development would occur when a leaseholder submits an APD” (e.g., BFO EA pg. 9). Although density and surface disturbance caps (BFO and Hilina ARMPs Appendix E) are assessed at the scale of a biologically significant unit (BSU [BFO ARMP pg. 2-1]), this approach does not account for impacts that may occur across BSUs, and does not effectively consider cumulative effects. By not prioritizing lease sales on lands outside of sage-grouse habitat and instead relying on site-level approaches to assess and mitigate potential impacts, the BLM is failing to manage sage-grouse at spatial scales conducive to maintaining populations.

Reasonably Foreseeable Impacts

The BLM does not provide an analysis of the potential impacts to sage-grouse of developing the parcels being proposed for lease in the EAs. Instead, BLM indicates that without a discrete development proposal, surface disturbing activities cannot be reasonably predicted and therefore impacts cannot be assessed until the APD stage (e.g., BFO EA pg. 65). But, the BLM acknowledges that it “assumes there is a high interest in development of any leased parcels” which would result in surface disturbance (BFO EA pg. 25; NCD EA pg. 19). In fact, the BLM estimates the number of wells expected to be drilled each year on the leases, along with the resulting surface disturbance (sections 3.2 BFO and NCD EAs). Given that the BLM expects surface impacts as a direct result of leasing, the potential for development of the leases should be seen as reasonably foreseeable. In this context, the absence of a discrete development proposal does not preclude an assessment of the impacts from development of the leases. Such development is a foreseeable possibility and the potential direct and indirect effects of that development on sage-grouse should be assessed prior to leasing so that the assessment can be used to inform BLM’s decision about which parcels to offer for lease.

Cumulative Impacts (“death by 1,000 cuts”):—The March Montana sale is only one of several recent or proposed BLM lease sales involving substantial sage-grouse habitat in neighboring states (e.g., DOI-BLM-WY-R000-2017-0002-EA; DOI-BLM-WY-P000-2017-0002-EA; DOI-BLM-WY-D000-2018-0001-EA). But the local scale at which the BLM is restricting its assessment of impact establishes a situation where the agency’s ability to assess the cumulative effects of leasing and subsequently developing the parcels being considered for sale is severely limited. The BFO and NCD EAs do not discuss the potential cumulative effects of developing proposed leases on sage-grouse, instead suggesting

that indirect effects from exploration and development would be minimal (e.g., BFO EA pg. 66). The BLM defines cumulative effects as “the impact on the environment from one action added to other past, present, and reasonably foreseeable future actions” which can result in significant effects collectively (Billings ARMP pg. 6-8). As noted above, the EAs do not address the potential incremental impacts of developing the proposed leases on sage-grouse, and therefore cannot contribute to an estimate of cumulative effects as suggested in the EAs (BFO EA pg. 25; NCD EA pg. 20).

The Assessment, Inventory, and Monitoring (AIM) strategy developed by the BLM addresses the concerns voiced in the EAs that a lack of data precludes the ability to investigate potential landscape-scale impacts of developing proposed leases. The AIM strategy has a goal of providing guidance and data necessary to integrate key ecological attributes into resource allocation decisions, including providing the approaches and data necessary to evaluate cumulative effects of management actions necessary for assessments of the potential effects of landscape change (Toevs et al. 2011). Therefore, if BLM chooses to offer these lease parcels, assessments of potential impacts of developing proposed leases following approaches established in the AIM strategy would provide the BLM with reasonably foreseeable impact forecasts at scales appropriate for assessing cumulative effects. Doing such an assessment is critical prior to offering the leases.

The EAs’ failure to analyze the cumulative impacts of reasonably foreseeable future development is problematic because the FEISs for the ARMPs do not provide this information. The effects analyses presented in the FEISs do not consider impacts across types of infrastructure, and were summarized at spatial scales too large to be directly comparable to the proposed leases (Zurek and Henrichs 2007), thereby minimizing their applicability for estimating effects of leases individually or cumulatively in Montana. The effects analyses do not explicitly investigate cumulative effects across impacts, but focus on estimating the amount of surface area influenced by a single impact cumulatively across that impact (e.g., gas and oil wells; Manier et al. 2013). These analyses are done at the scale of a Management Zone, and provide relative estimates of the total acreage influenced by each impact type by the alternatives considered in the FEISs.

Moreover, the BLM concluded in the ARMP FEISs that, although implementation of the ARMPs is unlikely to preclude projects that may negatively impact sage-grouse populations from proceeding, protective measures considered in project-specific analyses cumulatively will result in protection of sage-grouse populations (e.g., Billings FEIS pgs. 4-687 and 4-688). The BLM also concludes in the FEISs (pg. 4-238) that “precise quantitative estimates of impacts generally are not possible because the exact locations of future actions are unknown, or habitat types affected by surface-disturbing activities cannot be predicted.”

After deferring the issue in its FEISs, the BLM now seeks to defer it again by making the same argument in the EAs. In effect, BLM offers a circular argument that, both at the ARMP and leasing stages, avoids addressing the need to manage at landscape spatial scales or consider cumulative effects of actions proposed.

Another issue with the BLM’s site-specific approach to mitigation involves invasive plants. At the time of a local-scale development application (e.g., an APD), site-specific inventory and effects analyses for invasive plants will be conducted (e.g., BFO EA pg. 58). This reliance on local-scale assessments and actions again restricts the ability of the BLM to manage sage-grouse habitats effectively at landscape spatial scales. The BLM acknowledges that “increased surface disturbance, motorized transportation, and human activity would increase the chance for invasive plants to establish and spread” (Billings FEIS pg. 4-650). The primary concern in Montana is the spread of cheatgrass and the resulting changes in fire frequency which ultimately eliminate fire-intolerant species such as sagebrush from the landscape (Miller et al. 2011). The first principle in the Integrated Rangeland Fire Management Strategy (2015) developed

by the BLM is to work at landscape scales precluding the need to develop management actions at multiple individual sites (pgs. 6 and 7). Further, in the National Framework for safeguarding America's lands from invasive species, the U.S. Department of Interior (2016) suggests that "preventing the introduction of invasive species is the first line of defense against biological invasion" (pg. 1). Therefore, given the need to work at landscape spatial scales to prevent the establishment of invasive plant species and safeguard against the resulting changes to fire frequency, and the importance of this prevention for the long-term maintenance of the sagebrush habitats sage-grouse depend, the BLM should consider the introduction and/or proliferation of invasive annual grasses a reasonably foreseeable impact and assess the potential consequences of these impacts prior to leasing. If BLM chooses to offer these lease parcels, assessments of potential impacts of the introductions and/or proliferation of cheatgrass as a result of developing proposed leases following approaches established as the Fire and Invasives Assessment Tool (www.sciencebase.gov/catalog/item/573d91f3e4b0dae0d5e57f83) would provide the BLM with reasonably foreseeable impact forecasts at scales appropriate for assessing cumulative effects, and are also critical prior to offering the leases.

Site-specific Mitigation Measures:---The BLM acknowledges that compensatory mitigation may be necessary based on site-specific environmental analyses (BFO EA pg. 14; NCD EA pg. 12). Mitigation measures are established in the EAs as timing limitations (TL), controlled surface use (CSU), and no surface occupancy (NSO) stipulations specific to habitat designation by lease parcel. In general, TL stipulations are a restriction on all surface disturbing and/or disruptive activities in specific areas during specific seasons; CSU stipulations consist of an anthropogenic surface disturbance cap of 3% and a density cap of 1 energy facility per 640 acres in the BSU assessment area in PHMA; and NSO stipulations are restrictions on all surface occupancy and surface disturbing activities in PHMA and within 0.6 mi of leks in GHMA and RHMA (BFO and NCD EAs Appendix B). These stipulations are focused on restricting the density of infrastructure in priority habitats, and reducing anthropogenic activity levels during the drilling phases of development. As the ARMPs and prioritization requirements recognize, however, stipulations alone are not sufficient to avoid all adverse impacts. For example, TL stipulations generally do not apply to the operation and maintenance of production facilities and CSU stipulations do not account for distance-effects of infrastructure. NSO stipulations in GHMA and RHMA are focused on reducing distance effects, but the NSO buffer distances are not sufficient to eliminate disturbance to leks. This suggests that residual effects will remain after the minimization measures established in the EAs are implemented. The BLM should recognize these specifically as reasonably foreseeable impacts and address them at the time of the lease sale, e.g., by deferring parcels and/or requiring additional compensatory mitigation measures.

Although results from studies investigating sage-grouse response to human activity suggest that timing restrictions may be effective while being implemented (Dzialak et al. 2012, Holloran et al. 2015), researchers have noted that timing restrictions on construction and drilling during the breeding season will not prevent impacts at other times of the year or during other phases of development (e.g., production phases) and therefore may not be sufficient to minimize impacts over the life of a development (Walker et al. 2007, Doherty et al. 2008). If BLM chooses to offer these lease parcels, mitigation measures that minimize human activity throughout the life of potential development projects (e.g., requiring liquid gathering systems in PHMA; Holloran et al. 2015) should be considered by BLM and established at time of lease sale.

Several authors have reported a "distance-effect" associated with the infrastructure of energy fields whereby sage-grouse are negatively influenced to a greater extent if infrastructure is placed near seasonal habitat with the response diminishing as distances from the habitat to infrastructure increase (Manier et al. 2013). The majority of the research has investigated the response of lekking sage-grouse to energy development, with studies consistently reporting impacts from infrastructure on the number of males occupying leks to approximately 2 miles, with lesser impacts consistently apparent to approximately 4

miles (Holloran 2005, Walker et al. 2007, Tack 2009, Harju et al. 2010, Johnson et al. 2011). Additionally, distance-effects of infrastructure associated with energy developments of between approximately 0.9 and 1.7 miles on average have been noted during nesting, brood-rearing, and winter (Doherty et al. 2008, Carpenter et al. 2010, Holloran et al. 2010, Dzialak et al. 2011, LeBeau 2012, Dinkins 2013, Fedy et al. 2014). If BLM chooses to offer these lease parcels, mitigation measures that minimize the effects of infrastructure on surrounding habitats (e.g., spatial prioritization of infrastructure at the scale of an individual lease parcel) should be established by the BLM prior to offering a lease.

Conclusion:—The site-specific scale at which the BLM is restricting its assessment of potential impact establishes a situation where the cumulative impacts of leasing and subsequently developing the parcels being considered for sale may not be realized until regional monitoring metrics suggest an adverse effect has already occurred (i.e., lek-based metrics assessed at the scale of a BLM Field Office). Sage-grouse are a landscape species (Connelly et al. 2004), yet within this landscape sage-grouse rely on habitats with a diversity of species and subspecies of sagebrush interspersed with a variety of other habitats (e.g., riparian meadows, agricultural lands, grasslands) that are used by sage-grouse during certain times of the year (e.g., summer) or during certain years (e.g., severe drought; Connelly et al. 2011). The diversity of resources sage-grouse require seasonally and annually must be considered holistically to provide the large, functional, connected habitat patches necessary to sustain populations of the species. Edmunds et al. (2017) suggest that population trends within relatively small management areas (e.g., BSUs) can differ from trends in the overall management unit (e.g., Field Office), indicating that regional-scale assessment metrics may not accurately depict what is occurring in smaller management units within the region. This suggests that an impact could be successfully mitigated at the site level, yet impacts may remain at larger scales (e.g., impacts to a critical travel corridor between seasonal ranges; impacts to a regionally-limiting seasonal habitat type); and these residual impacts would go unnoticed until regional populations suffer. The BLM should address the cumulative effects of the potential consequences of developing each lease parcel (i.e., in the context of baseline or existing conditions) and all lease parcels in combination prior to proposing the leases to ensure that adequate mitigation is implemented to protect regional populations of sage-grouse from the multi-scaled effects associated with development of the leases. Regional-scale impacts not sufficiently mitigated at the local scale could contribute to sage-grouse population declines at scales much larger than the management approach promoted by the BLM in the EAs, suggesting that user groups across the region could be impacted by actions resulting from the leasing of any individual parcel.

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EDUCATION

2005 Ph.D., Zoology and Physiology, University of Wyoming, Laramie, WY, USA. Dissertation: *Greater sage-grouse (Centrocercus urophasianus) population response to natural gas field development in western Wyoming*. Dr. Stanley H. Anderson, advisor.
1999 M.S., Zoology and Physiology, University of Wyoming, Laramie, WY, USA. Thesis: *Sage grouse (Centrocercus urophasianus) seasonal habitat use near Casper, Wyoming*. Dr. Stanley H. Anderson, advisor.
1991 B.S., Biology, Colorado College, Colorado Springs, CO, USA.

RECENT POSITIONS HELD

2015 – present Principal; Operational Conservation, LLC
2013 – present Chief Scientist; Wildlife Management Research Support (a fiscally-sponsored nonprofit research organization)
2005 – 2015 Principal and Senior Ecologist; Wyoming Wildlife Consultants, LLC
2002 – 2005 Doctoral Researcher; Wyoming Cooperative Fish and Wildlife Research Unit; University of Wyoming
1999 – 2005 Research Scientist; Wyoming Cooperative Fish and Wildlife Research Unit; University of Wyoming

PROFESSIONAL EXPERIENCE

2005 – present: **Principal, Operational Conservation, LLC; Chief Scientist, Wildlife Management Research Support; Principal and Senior Ecologist, Wyoming Wildlife Consultants, LLC.**
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I design, initiate and direct research and management programs specializing in long-term, coordinated conservation efforts focused towards science-based management of wildlife resources in the intermountain western U.S. The mission of my program is to develop and implement science-based solutions to wildlife management and conservation concerns. I am actively involved as a member of several multi-stakeholder working groups, technical teams, and advisory panels for conservation and management organizations where I routinely advise the development of science-based policies for the protection of wildlife populations and habitats. I have been working in the west for over 20 years developing and implementing conservation efforts aimed at enhancing greater sage-grouse and other sagebrush obligate species' habitats and populations. More recently I have been involved in a community-based program aimed at enhancing grassland habitats for neotropical migrants in the northern Great Plains. My duties include designing, funding, managing, analyzing, publishing and presenting orally original research and conservation approaches; fostering collaborative relationships and partnerships with state and federal agencies, industry, private landowners, NGOs and academia; managing research and business finances; supervising staff; and providing technical expertise for a wide variety of projects. I have authored or helped to author over 20 peer-reviewed publications, and regularly give presentations concerning wildlife and habitat conservation at professional conferences and to the general public. The day-to-day responsibilities of being a small business owner have provided me with unique and expanded leadership,

supervisory, team-building and collaboration, fundraising, budgeting and financial management, and communication experience.

Project-specific Information:

- *The Sagebrush Institute*. Co-PI. I am designing and initiating a Sagebrush Institute, which is a holistic strategy for implementing sustained conservation across the breadth of the sagebrush ecosystem, with a focus on building local-scale management into landscape-scale conservation. The premise for the Institute is that the work done to support sage-grouse conservation provides an opportunity to pursue the conservation model of the future, conceived broadly to encompass the sagebrush landscape as well as the multiple species and people that rely thereon. Financial support provided by the National Audubon Society.
- *North American Grassland Bird Conservation Program*. Co-PI. I am designing and implementing monitoring and conservation efficacy protocols for the National Audubon Society and their Conservation Ranching program in grasslands throughout the central flyway. Conservation Ranching is a landowner-focused program with the goal of providing economic security to participating landowners through the conservation of grassland habitats. These are regional-level efforts built on a foundation that can be applied across the grassland as well as other ecosystems (e.g., sagebrush). Financial support provided by the Margaret A. Cargill Foundation, the National Audubon Society and Ducks Unlimited.
- *Thunder Basin Coordination Initiative – Conservation on a Landscape Scale*. Co-PI. I am working with the Thunder Basin Grassland Prairie Ecosystem Association and the National Audubon Society in a coordinated on-the-ground conservation project in northeastern Wyoming detailing the steps required to move from planning conservation to implementing measures in a coordinated fashion to maximize landscape-scale conservation effect. Financial support provided by the Margaret A. Cargill Foundation.
- *Range-wide Greater Sage-Grouse Compensatory Mitigation Plan for the Bureau of Land Management*. Species Expert. I was a co-author of a comprehensive sage-grouse mitigation approach for the Bureau of Land Management lead by the Wildlife Conservation and Mitigation Program at Texas A&M Institute of Renewable Natural Resources.
- *Wyoming sage-grouse core area health assessment*. Co-PI. Project designed to quantify the response of sage-grouse populations to the implementation of the Greater Sage-grouse Core Area Policy in Wyoming. Financial support provided by the Wyoming Governor's Office, Wyoming Sage-grouse Local Working Groups, and the Pinedale Field Office of the Bureau of Land Management.
- *Greater sage-grouse habitat quantification tool: a multi-scaled approach for assessing impacts and benefits to greater sage-grouse habitat*. Species Expert. Colorado Parks and Wildlife and Environmental Defense Fund (EDF) project designed to develop and implement a Habitat Exchange for sage-grouse in Colorado and Wyoming. I worked on the science advisory team developing the habitat quantification tool. The habitat quantification approaches developed also provide the foundation for the Habitat Exchange established in Nevada. I continue to provide technical support to EDF staff assisting the development of a Habitat Exchange in Montana.
- *Upper Green River Conservancy*. Species Expert. I provide technical support for the development and implementation of a sagebrush landscape-focused conservation bank in southwestern Wyoming in support of WRA, Inc.
- *Sage-grouse and energy development: predicting population response to infrastructure for adaptively informing management and conservation*. Co-PI. Project designed to develop decision support tools (DSTs) and a framework for DST implementation for use minimizing on-site impacts of energy development to nesting female sage-grouse at the scale of an energy development. Financial support provided by the Wyoming State Office of the Bureau of Land Management.
- *Modeling sage-grouse habitat suitability in the Thunder Basin, Wyoming*. Co-PI. Project designed to develop spatial tools for informing and prioritizing sage-grouse conservation and restoration actions throughout northeastern Wyoming in support of a Candidate Conservation Agreement/with Assurances (CCA/CCAAs). Financial support provided by the Thunder Basin Grassland Prairie Ecosystem Association and the Northeast Wyoming Sage-grouse Local Working Group.
- *Review of Draft and Final Greater Sage-grouse Environmental Impact Statements and Land Use Plan Amendments*. Species Expert. I reviewed and provided written and oral comment on the scientific rigor of the

- draft and final EISs and LUPAs developed for sage-grouse across the western U.S. in support of the Pew Charitable Trust.
- *Enhancing fitness or gizzard envy: are sage-grouse selecting winter habitats in southwestern Wyoming with an eye towards eating dirt?* Co-PI. Field study designed to assess the importance of the availability and distribution of geophagy sites (places where soil is consumed) to sage-grouse selection of winter habitats in southwestern Wyoming. Financial support provided by the Upper Green River Basin Sage-grouse Local Working Group, the Wyoming Landscape Conservation Initiative, the Wyoming State Office of the Bureau of Land Management, and the Wyoming Agriculture Producer Research Grant Program.
 - *Mitigation by Design: making the connection between habitat, disturbance, restoration and resource economics.* Co-PI. Project designed to define relationships between: (a) wildlife habitat use and demographics, (b) impacts of development on ecosystem function and habitat values, and (c) restoration practices and costs to infer opportunity cost of energy development (based on cost of recovery). Financial support provided by the U.S. Geological Survey.
 - *A study of the impacts of a wind energy development on greater sage-grouse in southwestern Wyoming.* Co-PI. Field study designed to assess the population-level effects of wind energy development on female sage-grouse seasonal habitat selection and demography. Financial support provided by multiple entities including: PacificCorp Energy, BDP Renewables North America, Iberdrola Renewables, EnXco, National Wind Coordinating Collaborative, Shirley Basin/Bates Hole, Southwest and South Central Wyoming Local Sage-grouse Working Groups, United States Department of Energy, Wyoming Reclamation and Restoration Center and School of Energy Resources at the University of Wyoming, Avian Power Line Interaction Committee, the American Wind Energy Association, and the Margaret and Sam Kelly Ornithological Research Fund. Data collected during the first 2 years of this study were transferred to the University of Wyoming resulting in the MSc thesis: *Evaluation of Greater Sage-Grouse Reproductive Habitat and Response to Wind Energy Development in the South-Central, Wyoming* (LeBeau 2012).
 - *Greater sage-grouse habitat enhancement plan in support of the wildlife hazard management plan for the Jackson Hole Airport.* Species Expert. I designed monitoring and adaptive management protocol, and advised on project implementation in support of a collaboratively developed sage-grouse habitat management and mitigation plan for Grand Teton National Park, Wyoming. I continue to provide technical support for the development of the EA necessary to implement the management actions suggested in support of EnviroSystems Management Inc.
 - *Grazing influence, objective development, and management in Wyoming's greater sage-grouse habitat with emphasis on nesting and early brood-rearing.* Species Expert. State of Wyoming project designed to develop livestock grazing protocols for sage-grouse population conservation and sagebrush habitat management in Wyoming. I was a member of the team developing these protocols and assisted writing the report.
 - *Steward to Red Butte No. 2 Transmission Line Environmental Impact Statement.* Species Expert. I assisted developing and writing the impact and mitigation assessment sections of the Steward to Red Butte transmission line EIS in support of BPG, Inc.
 - *Wyoming Basin Rapid Ecoregional Assessment.* Species Expert. U.S. Geological Survey project designed to develop a rapid ecoregional assessment for the Wyoming Basin, with the goal of providing information to the Bureau of Land Management in support of regional planning and analysis for management of ecological resources in the region. I provided direction to the assessment of sagebrush habitats and sagebrush-dependent species and wrote these portions of the report.
 - *Assessing the effectiveness of southwestern Wyoming core areas for greater sage-grouse conservation: a spatially-explicit demographic approach using management and resource development scenarios.* Species Expert. USGS project designed to develop decision support tools for exploring the implications of alternative resource development scenarios on individual sage-grouse in Wyoming. I assisted parameterizing models required to address objectives.
 - *A study of the vegetative response of mule deer winter range to fertilization in southwestern Wyoming.* Co-PI. Field study designed to assess the effects of fertilization on mule deer winter range quality. Financial support provided by the Pinedale Anticline Project Office.
 - *Greater sage-grouse seasonal habitat selection and demographics on a landscape destined for an in-situ uranium mine.* PI. Field study designed to establish a pre-development baseline for a sage-grouse population

- that may be influenced by *in-situ* uranium mining activity such that a post-development BACI-designed study could be conducted. Financial support provided by Ur-Energy.
- *Holistic greater sage-grouse management on a ranch destined for wind development*. PI. Field study designed to forecast the population-level response of sage-grouse to wind energy development and use those projections to guide proactive conservation as informed through empirically-informed state-and-transition models. Financial support provided by Pathfinder Renewable Wind Energy, LLC.
 - *Winter habitat selection of greater sage-grouse relative to activity levels at natural gas well pads in southwestern Wyoming*. PI. Field study designed to estimate differences in responses of wintering sage-grouse to natural gas field infrastructures with different levels of recurring human activity thereby empirically investigating a potential option for reducing on-site impacts of energy development to the species. Financial support provided by multiple entities including: Shell Rocky Mountain Production, QEP Energy Company, Ultra Resources Inc., Tom Thorne Sage-grouse Conservation Fund, and the Upper Green River Basin Wyoming Sage-grouse Local Working Group.
 - *Identifying habitats for greater sage-grouse population persistence on Atlantic Rim, Rawlins, Wyoming: A process of protecting specific areas within a developing natural gas field critical for population sustainability in an adaptive management framework*. Research Initiator. Field study designed to identify areas-of-critical-conservation-concern based on limiting seasonal habitats, risk assessment, multi-seasonal occurrence, and seasonal juxtaposition for informing infrastructure placement within a developing gas field. This study was transferred to the University of Wyoming resulting in the MS thesis: *Quantifying habitat importance for greater sage-grouse (Centrocercus urophasianus) population persistence in an energy development landscape* (Kirol 2012).
 - *Habitat mitigation planning for greater sage-grouse in the Upper Green River Basin, Wyoming*. PI. Field study designed to compile the wildlife and vegetative information, and establish the landowner contacts required to effectively prepare allotment scale habitat management plans. Financial support provided by the Tom Thorne Sage-grouse Conservation Fund, Upper Green River Basin Sage-grouse Local Working Group, and the North American Grouse Partnership.
 - *Yearling greater sage-grouse response to energy development in Wyoming*. PI. Field study designed to ascertain if natural-gas development influenced the distribution of, or the probability of recruiting into the breeding population yearling male and female sage-grouse. Financial support provided by multiple entities including: Bureau of Land Management, U.S. Department of Energy, Wyoming Game and Fish Department, Yellowstone-to-Yukon Initiative, EnCana Oil & Gas Inc., Ultra Resources Inc., and Shell Rocky Mountain Production.

2002 – 2005: **Ph.D. Candidate; University of Wyoming.**

Dr. Stanley H. Anderson (Advisor [deceased]); Leader, Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, WY 82071; Dr. Matt Kaufman (*current unit leader*), (307) 766-5415 (voice); mkauffm1@uwyo.edu.

Project-specific Information:

- Doctoral researcher for the study: Holloran, M. J. 2005. *Greater sage-grouse (Centrocercus urophasianus) population response to natural gas field development in western Wyoming*. Dissertation, University of Wyoming, Laramie, USA. Field study designed to determine if and how the development of natural gas resources influenced greater sage-grouse populations in the upper Green River Basin of southwestern Wyoming.

1999 – 2005: **Research Scientist; Wyoming Cooperative Fish and Wildlife Research Unit.**

Dr. Stanley H. Anderson (Supervisor [deceased]); Leader, Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, WY 82071; Dr. Matt Kaufman (*current unit leader*), (307) 766-5415 (voice); mkauffm1@uwyo.edu.

Project-specific Information:

- *Grazing system and linear corridor influences on greater sage-grouse (Centrocercus urophasianus) habitat selection and productivity*. Research Initiator. Field study designed to determine the effects of differing cattle

- grazing practices on sagebrush dominated landscapes as they relate to sage-grouse seasonal habitat selection and productivity. This study was transferred resulting in an MS thesis (Kuipers 2004).
- *Sage-grouse (Centrocercus urophasianus) use of different-aged burns and the effects of coyote control in southwestern Wyoming.* Research Initiator. Field study designed to determine the temporal effects to sage-grouse survival and productivity of prescribed fire by quantifying use of different aged sagebrush burns. This study was transferred resulting in an MS thesis (Slater 2003).
 - *Greater sage-grouse seasonal habitat selection and survival in Jackson Hole, Wyoming.* PI. Study designed to document sage-grouse seasonal habitat selection and survival, identified limiting seasonal range(s), and quantified habitat conditions associated with sustainable and increasing productivity in an isolated sage-grouse population in western Wyoming.

RECENT PEER-REVIEWED PUBLICATIONS and REPORTS

- Wuenschel, A., A. L. Hild, G. B. Paige, and M. J. Holloran. *In Review*. Structural patterns in habitat revealed upon a fine-scale, spatially explicit investigation. *Ecosphere*.
- Burkhalter, C., M. J. Holloran, B. C. Fedy, H. E. Copeland, R. L. Crabtree, S. C. Jay, B. A. Rutledge, and A. G. Holloran. *In Press*. Assessing landscape-scale habitat condition for an imperiled avian species: the greater sage-grouse in Wyoming. *Animal Conservation*.
- Decker, K., A. Pocerwicz, S. Harju, M. Holloran, M. Fink, T. P. Toombs, and D. B. Johnston. 2017. Landscape disturbance models consistently explain variation in ecological integrity across large landscapes. *Ecosphere* 8:e01775. 10.1002/ecs2.1775
- LeBeau, C. W., J. L. Beck, G. D. Johnson, R. M. Nielson, M. J. Holloran, K. G. Gerow, and T. L. McDonald. 2017. Greater sage-grouse male lek counts relative to wind energy development. *Wildlife Society Bulletin*; DOI: 10.1002/wsb.725.
- LeBeau, C. W., G. D. Johnson, M. J. Holloran, J. L. Beck, R. M. Nielson, M. Kauffman, E. Rodemaker, and T. L. McDonald. 2017. Greater sage-grouse, habitat selection, survival, and wind energy infrastructure. *Journal of Wildlife Management*; DOI: 10.1002/jwmg.21231.
- Zabihi, K., G. B. Paige, A. L. Hild, S. N. Miller, A. Wuenschel, and M. J. Holloran. 2017. A fuzzy logic approach to analyze suitability of nesting habitat for greater sage-grouse in western Wyoming. *Journal of Spatial Science*; DOI: 10.1080/14498596.2017.1292965.
- Holloran, M. J., B. C. Fedy, and J. Dahlke. 2015. Winter habitat use of greater sage-grouse relative to activity levels at natural gas well pads. *Journal of Wildlife Management* 79:630-640.
- Kirol, C. P., J. L. Beck, S. V. Huzurbazar, M. J. Holloran, and S. N. Miller. 2015. Identifying greater sage-grouse source and sink habitats for conservation planning in an energy development landscape. *Ecological Applications* 25:968-990. <http://dx.doi.org/10.1890/13-1152.1>
- Fedy, B. C., K. E. Doherty, C. L. Aldridge, M. O'Donnell, J. L. Beck, B. Bedrosian, M. J. Holloran, G. D. Johnson, N. W. Kaczor, C. P. Kirol, C. A. Mandich, D. Marshall, G. McKee, C. Olson, A. Pratt, C. C. Swanson, and B. L. Walker. 2014. Habitat prioritization across large landscapes, multiple seasons, and novel areas: an example using greater sage-grouse in Wyoming. *Wildlife Monographs* 190:1-39.
- LeBeau, C. W., J. L. Beck, G. D. Johnson, and M. J. Holloran. 2014. Short-term impacts of wind energy development on greater sage-grouse fitness. *Journal of Wildlife Management* 78:522-530.
- Manier, D. J., D. J. A. Wood, Z. H. Bowen, R. M. Donovan, M. J. Holloran, L. M. Juliusson, K. S. Mayne, S. J. Oyler-McCance, F. R. Quamen, D. J. Saher, and A. J. Titolo. 2013. Summary of science, activities, programs, and policies that influence the rangewide conservation of greater sage-grouse (*Centrocercus urophasianus*). U.S. Geological Survey Open-File Report 2013-1098. <http://pubs.usgs.gov/of/2013/1098/>
- Fedy, B. C., C. L. Aldridge, K. E. Doherty, M. O'Donnell, J. L. Beck, B. Bedrosian, M. J. Holloran, G. D. Johnson, N. W. Kaczor, C. P. Kirol, C. A. Mandich, D. Marshall, G. McKee, C. Olson, C. C. Swanson, and B. L. Walker. 2012. Interseasonal movements of greater sage-grouse, migratory behavior, and an assessment of the core regions concept in Wyoming. *Journal of Wildlife Management* 76:1062-1071.
- Johnson, D. H., M. J. Holloran, J. W. Connelly, S. E. Hanser, C. L. Amundson, and S. T. Knick. 2011. Influences of environmental and anthropogenic features on greater sage-grouse populations, 1997-2007. pp. 407-450 in S. T. Knick and J. W. Connelly (editors). *Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats*. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA, USA.

- Naugle, D. E., K. E. Doherty, B. L. Walker, H. E. Copeland, M. J. Holloran, and J. D. Tack. 2011. Sage-grouse and cumulative impacts of energy development. pp. 55-70 in D. E. Naugle (editor). *Energy development and wildlife conservation in western North America*. Island Press, Washington, DC, USA.
- Naugle, D. E., K. E. Doherty, B. L. Walker, M. J. Holloran, and H. E. Copeland. 2011. Energy development and greater sage-grouse. pp. 489-503 in S. T. Knick and J. W. Connelly (editors). *Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats*. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA, USA.
- Holloran, M. J., R. C. Kaiser, and W. A. Hubert. 2010. Yearling Greater Sage-grouse Response to Energy Development in Wyoming. *Journal Wildlife Management* 74:65-72.
- Cagney, J., E. Bainter, B. Budd, T. Christiansen, V. Herren, M. Holloran, B. Rashford, M. Smith and J. Williams. 2010. Grazing influence, objective development, and management in Wyoming's greater sage-grouse habitat with emphasis on nesting and early brood-rearing. University of Wyoming Cooperative Extension Service report B-1203. University of Wyoming, Laramie, USA.
- Johnson, G., and M. Holloran. 2010. Greater sage-grouse and wind energy development: a review of the issues. Renewable Northwest Project, Portland, OR, USA. <http://www.rnp.org/node/956>
- Kiesecker, J. M., H. Copeland, A. Pocewicz, N. Nibbelink, B. McKenney, J. Dahlke, M. Holloran, and D. Stroud. 2009. A framework for implementing biodiversity offsets: selecting sites and determining scale. *BioScience* 59:77-84.
- Thompson, K. M., M. J. Holloran, S. J. Slater, J. L. Kuipers, and S. H. Anderson. 2006. Early brood-rearing habitat use and productivity of greater sage-grouse in Wyoming. *Western North American Naturalist* 66:332-342.
- Holloran, M. J., and S. H. Anderson. 2005. Greater sage-grouse population response to natural gas development in western Wyoming: are regional populations affected by relatively localized disturbances? *Transactions North American Wildlife and Natural Resources Conference* 70:160-170.
- Holloran, M. J., and S. H. Anderson. 2005. Spatial distribution of greater sage-grouse nests in relatively contiguous sagebrush habitats. *Condor* 107:742-752.
- Holloran, M. J., B. J. Heath, A. G. Lyon, S. J. Slater, J. L. Kuipers, and S. H. Anderson. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. *Journal Wildlife Management* 69:638-649.
- Holloran, M. J., and S. H. Anderson. 2004. Greater sage-grouse seasonal habitat selection and survival in Jackson Hole, Wyoming. Completion Report. Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, Laramie, USA.
- Holloran, M. J., and S. H. Anderson. 2003. Direct identification of northern sage-grouse, *Centrocercus urophasianus*, nest predators using remote sensing cameras. *Canadian Field-Naturalist* 117:308-310.

GRADUATE COMMITTEE INVOLVEMENT

- Wuenschel, Amarina. 2014. *Ecological and Fine-Scale Spatial variation in Vegetation at Sage-grouse Nests in western Wyoming*. Thesis, Department of Ecosystem Science and Management, University of Wyoming, Laramie, USA.
- Kirol, Christopher, P. 2012. *Quantifying habitat importance for greater sage-grouse (Centrocercus urophasianus) population persistence in an energy development landscape*. Thesis, Department of Ecosystem Science and Management, University of Wyoming, Laramie, USA.
- LeBeau, Chad, W. 2012. *Evaluation of Greater Sage-Grouse Reproductive Habitat and Response to Wind Energy Development in South-Central Wyoming*. Thesis, Department of Ecosystem Science and Management, University of Wyoming, Laramie, USA.
- Macsalka, Natalie. 2011. *Assessing the conflict between wind energy development and sage-grouse conservation in Wyoming: An application using a spatially-explicit wind development model*. Thesis, Department of Agricultural and Applied Economics, University of Wyoming, Laramie, USA.

SELECT PROFESSIONAL PRESENTATIONS

- 2016 Holloran, M. J. (presenter). *How does science fit into Audubon's Conservation Ranching Program?* Audubon Rockies Conservation Ranching Workshop, Rapid City, SD, USA. *Invited*
- 2015 Holloran, M. J. (presenter). *Rangeland Monitoring*. Wyoming Sage-grouse Habitat Restoration Workshop, Casper, WY, USA. *Invited*